# FIRMS Web Fire Mapper Exercise

## Introduction

The Fire Information for Resource Management System (FIRMS) was developed by the University of Maryland, with funds from NASA's Applied Sciences Program and the UN Food and Agriculture Organization. It provides near real-time active fire locations to natural resource managers that face challenges obtaining timely, satellite-derived fire information.

FIRMS delivers MODIS hotspots and fire locations on a near real-time basis in easy to use formats. MODIS Active Fire Detection represents the center of a 1km pixel that has been flagged as containing one or more actively burning hotspots and/or areas. Fires are only detected if they are burning at the time of the overpass. Additionally, fires may not be detected if they are cool, small, or if they are obscured by smoke or clouds. MODIS takes daily images of the Earth, but there are gaps in coverage at the equator, so these data are available every 1-2 days.

For this short exercise, we will explore the FIRMS website and download recent and archived VIIRS Active Fire data. We will then open the active fire hotspots data in Google Earth and examine recent wildfires in California. Similar data types will be explored in subsequent exercises.

## Objectives

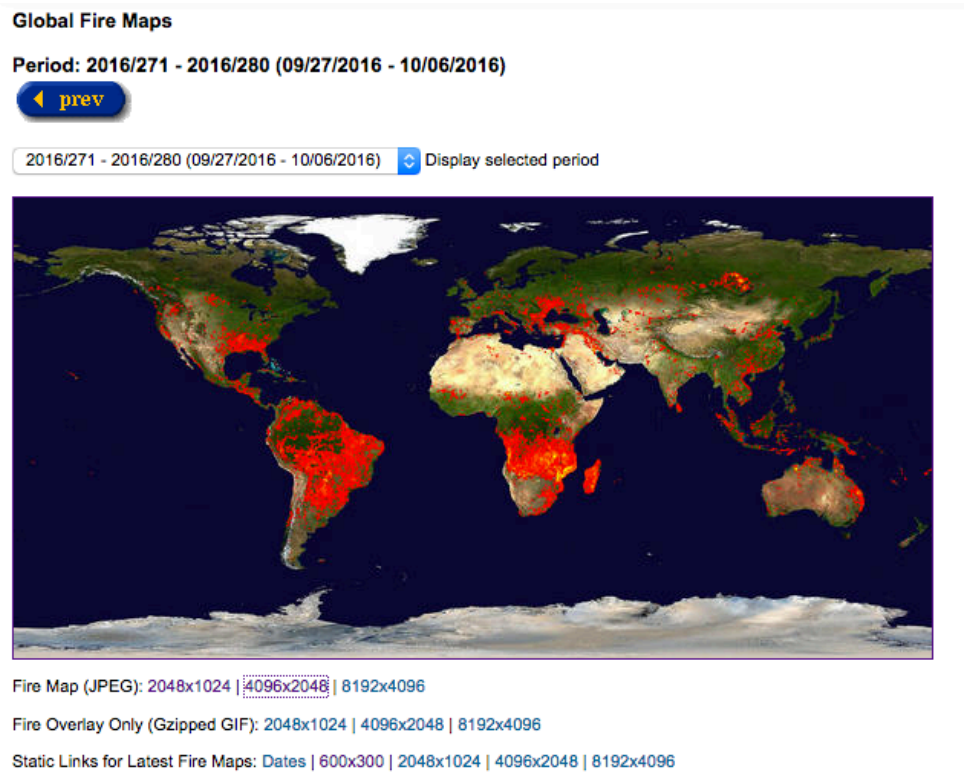
- Become familiar with the FIRMS website
- Understand what data are provided in the MODIS and VIIRS Active Fire Products
- Use the FIRMS Active Fire Mapper to identify recent wildfire activity and progression in California
- Obtain the tools and tips necessary to access the FIRMS Web Fire Mapper to meet future workplace needs

## Exploring FIRMS

FIRMS website: http://earthdata.nasa.gov/earth-observation-data/near-real-time/firms

- Click on the arrows next to **MODIS Active Fire Products** and **VIIRS Active Fire Products** and read the descriptions

    - You will notice that a transition to MODIS Collection 6 data is occurring on the site
- Click on the **MCDI4DL** link for more information about the MODIS near-real time products
- Go back to the previous page and scroll down to the **Get hotspots/fire locations** section
- Click on **Fire Email Alerts**
    - **If you are interested,** you can subscribe to email alerts for new wildfire events for a particular region. If not, simply go back to the main page.
- Click on **Global Fire Maps** and click on the **global 10-day fire maps** link at the bottom of the page
    - Select the time period **2016/271 – 2016/280 (09/27/2016 – 10/06/2016)**
        - Click on the **Fire Map (JPEG): 2048x1024**
        - This will display all the fires detected from MODIS during this time period.




- Go back to the main page here: http://earthdata.nasa.gov/earth-observation-data/near-real-time/firms and click on **Web Fire Mapper**
    - Take a look at the tools on the left side of the mapper. These include: zoom, global full extent, pan, and identify.

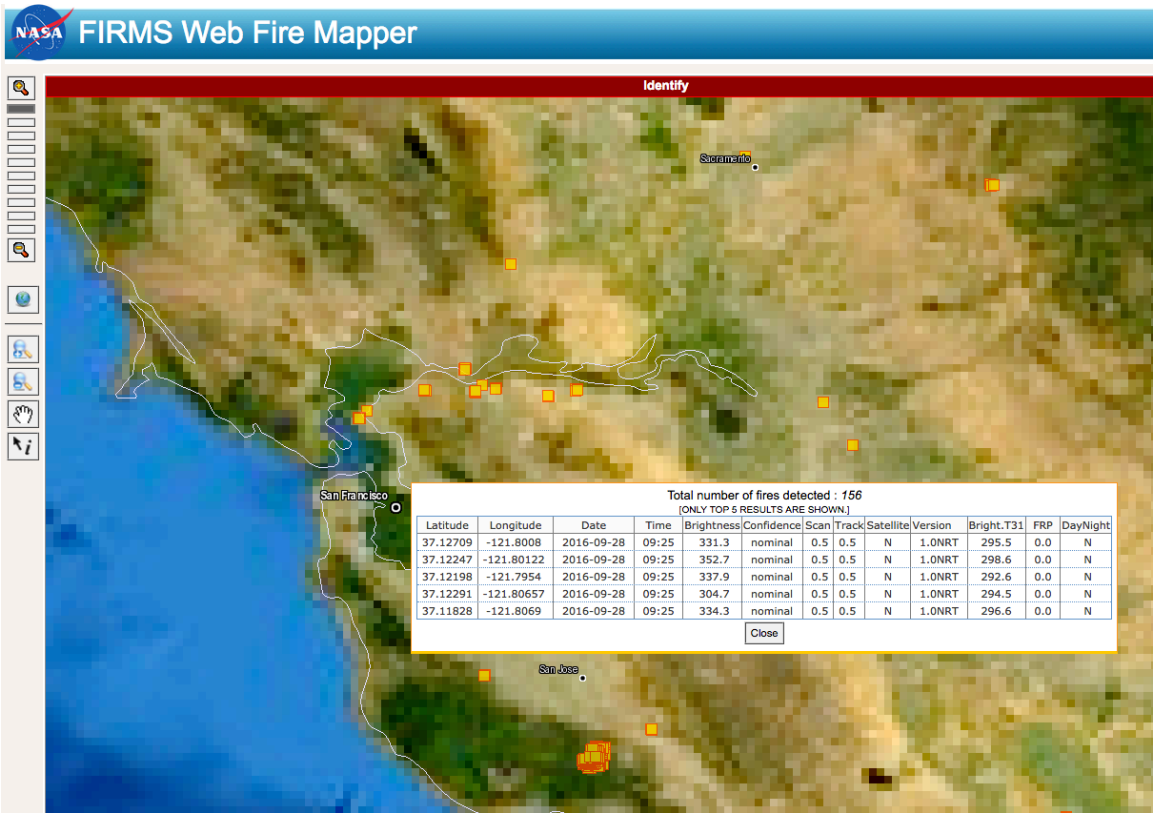
- Take a look at the map layers on the right side of the mapper. Keep the data source and time period as default settings.
  - The default should be Data Source: VIIRS 375 m and Time Period: Past 24 hours

- Click on the **Background Images** tab and select **Blue Marble**
- Zoom in on California
- Once you have zoomed into California, select the pan icon  to move around on the map
  - Are there any current fires burning?

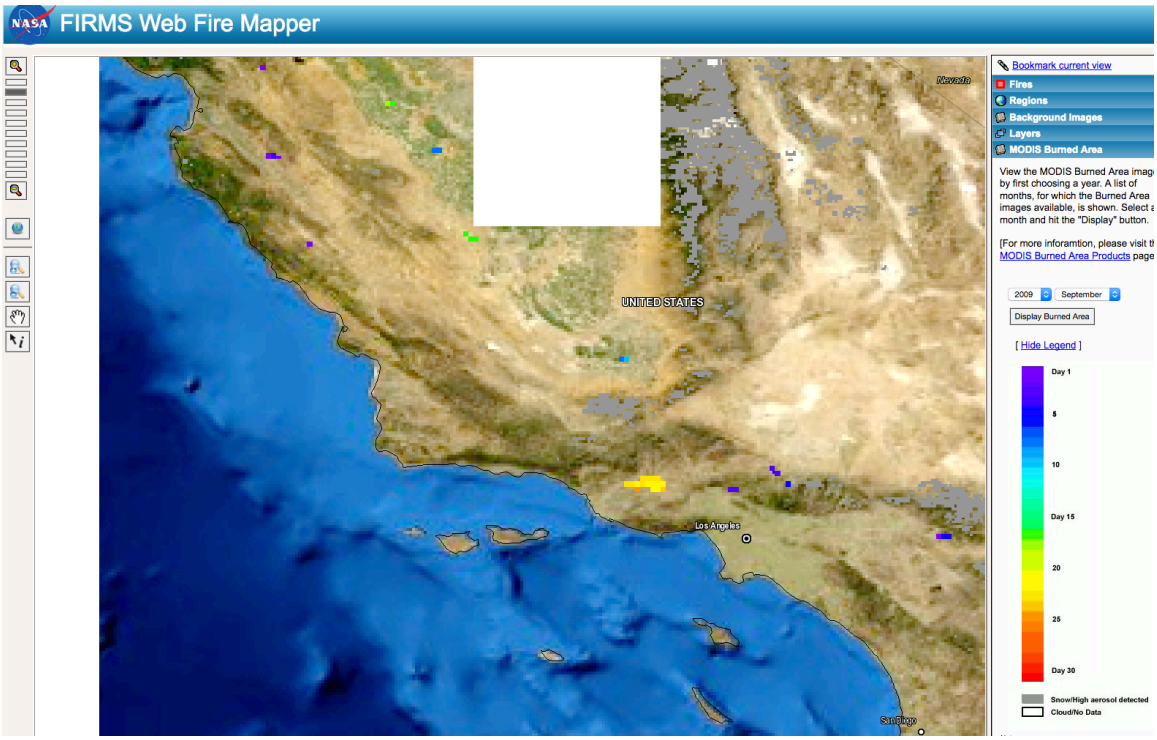

- Click on the Fires tab on the right panel
- Select the **Custom** time period setting
  - Change the dates to 2016-09-23 to 2016-09-28, then click on **Update**
  - Zoom into the region just south of San Jose. You should see a cluster of fire pixels.
    - Can you guess which fire is burning here? Hint: We mentioned it earlier in the lecture.

- Click on the information icon  on the left panel
  - Then click on the cluster of fire pixels just south of San Jose
  - This will provide you with information about pixel location, date, the brightness temperature, etc.
    - The brightness temperature of a fire pixel is measured (in Kelvin) using the MODIS channels 21/22 and channel 31. Brightness temperature is actually a measure of the photons

at a particular wavelength received by the spacecraft, but it is presented in units of temperature.
    - Generally, brightness temperatures between 300-320 K are used to distinguish active fires.
- Click on **Close** to exit out of the fire information table




- Click back on the pan tool  on the left panel
- Go back to the **Background Images** option on the right panel and select **Natural Earth**
- Click on the **MODIS Burned Area** option
    - This will display past fires and the day of the month the active fire was detected
    - Select **2009 September** and click on Display Burned Area. You may need to wait a few seconds for the image to load.
        - If the display is all white, you may need to zoom out for the map to display properly
        - Click on **Show Legend** to see how the colors correspond to the day of the month the fire burned
        - Zoom into the area northwest of Los Angeles



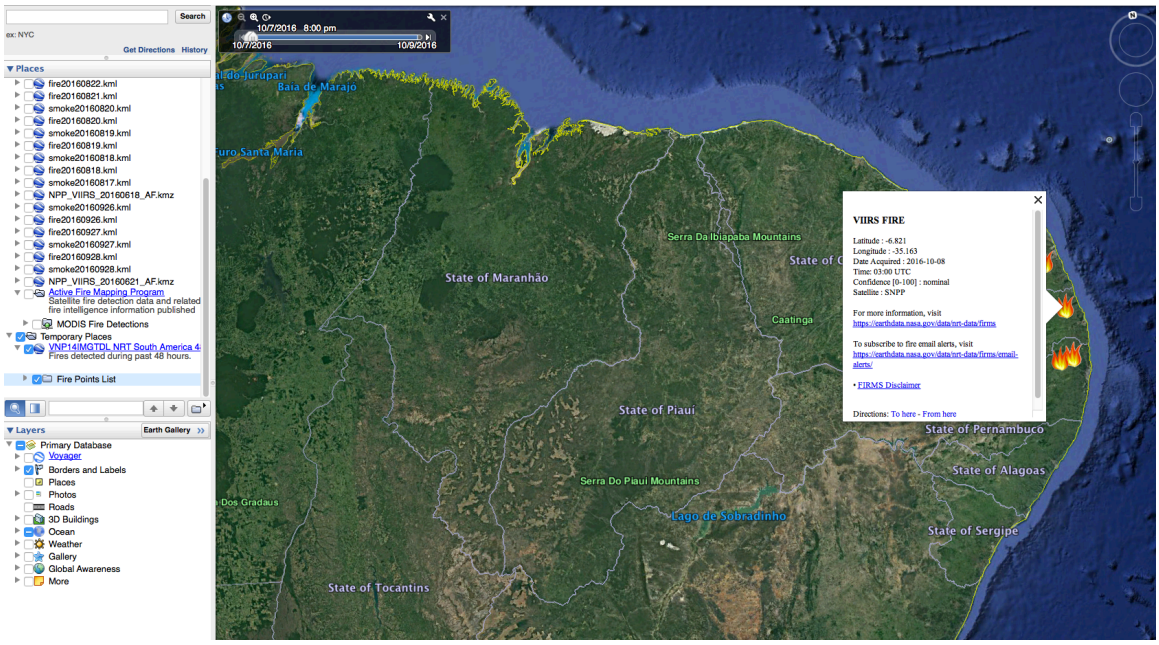

        - You should see multiple fire pixels that indicate a fire burned around the September 20-25th, 2009 timeframe
    - This shows the Guiberson Fire that burned between Fillmore and Moorpark
        - If you are interested, here are a few links about that fire:
            - http://wildfiretoday.com/2009/09/23/guiberson-fire-burns-8500-acres-nw-of-los-angeles/
            - http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=40374

- Go back to the main page here: https://earthdata.nasa.gov/earth-observation-data/near-real-time/firms and click on **Download Active Fire Data**
- Click on the arrow next to **KML**

    - Click on the VIIRS 375 m data for the last 48 hours 

in South America
        - Note that there are two options for the last 48 hours. The option with the asterisk is an animated KML file that provides a time slider to view how fires have progressed over the last 48 hours. The option without an asterisk is simply all of the fires that burned in the last 48 hours. Make sure to choose the animated file.
    - The file should automatically download to your computer.

- Google Earth may also automatically open. However, if it does not Start Google Earth
    - Open and view the VIIRS active fire data in Google Earth and zoom to South America
    - Are there any fires currently burning in South America? If so, where are the majority of fires occurring?
- Use the time slider on the top left to see how fires in South American have progressed over the 48 hours.
    - The time frame will initially include the entire 48 hours. Move the arrow icon  on the right side of the time slider to the left to shorten the time window.
    - You can also isolate a specific time within the 48 hours in two ways: by moving the parenthesis icon  to the right and the arrow icon to the left or by clicking on the wrench icon  and manually setting the time period of interest. Here you can also change the animation speed and loop the animation if you would like.
- Either set a specific time period of interest or reset the time slider to include the entire 48 hours.
    - Click on the clock icon  and watch the animation play
- Click on any fire icon 
    - You should be given some general information about that fire detected and a few links that direct you back to the FIRMS website




- Go back to the Active Fire Data page on FIRMS: http://earthdata.nasa.gov/earth-observation-data/near-real-time/firms/active-fire-data
- Click on the arrow next to the **Archive Download Tool**, then click on the **Archive Download Tool** link
- Click on the orange box next to **New Request** called **Create**


  - This tool is used to acquire imagery that is older than 48 hours
- We will create a new request. You are not required to submit the request, but take some time to go through the request steps.
  - Zoom into any region of interest on the map feature
  - Click on the **Draw Polygon** button
    - Hover over the map and draw a polygon by clicking on the four corners of your polygon. Then double click on the final corner to save that region. When you do this, your polygon will turn orange.
      - Alternatively, you could create your own rectangle by entering specific coordinates
  - Select the **MODIS C6** Fire Source
  - Select a date range of interest
  - Select the **Shapefile (.shp)** Output Format


- Enter your email address
- Click on **Save**
  - You are not required to complete this step, but you can if you are interested in obtaining a example shapefile
- If you clicked on **Save**, you should then see a confirmation page that says *Your data request has been successfully submitted*
  - When the data are ready, you will receive an email with download instructions

This concludes the **Exploring FIRMS** exercise. As you can see, FIRMS is a great resource for active fires locations and provides you with fire locations in a variety of formats. Additional resources (that are provided as links on FIRMS) include Earthdata Search and Worldview, which have been discussed in today's training.